

REMARKS

Attached hereto is a fee and Petition for Extension of Time.

Claims 1-12, 15-18, and 21-23 are all the claims presently pending in the application. Claims 13, 14, 19, and 20 have been canceled. New claim 23 has been added to highlight that the present invention includes the recognition that the thickness of the color filter film is a critical parameter to achieving a fine pattern for the pixel electrode contact hole. That is, in the specific LCD configuration in which the color filter film is used both for forming the color filter and for covering the thin film transistor, the present inventor has recognized that there are two conflicting requirements of the thickness of the color film layer.

First, the layer must be sufficiently thick to form an adequate pixel color filter region. Second, in contrast, the layer must be sufficiently thin for purpose of allowing a fine pattern for the pixel electrode contact hole to be formed. Prior to the present invention, it was not recognized that the thickness of the color film layer had these two conflicting requirements in this LCD configuration.

Along this line, the Examiner considers that there are no claims generic to the two embodiments shown in Figures 3 and 5 and has accordingly constructively withdrawn claims 2, 7-10, 15, and 27 from consideration.

In response, Applicant has amended claims 11 and 17 to clarify that the two embodiments are indeed appropriately described by a generic claim wording that focuses on the two conflicting requirements of the film thickness. Accordingly, Applicant declines at this time to cancel claims that the Examiner has constructively withdrawn.

It is noted that the claims have been amended solely to more particularly point out Applicant's invention for the Examiner, and not for distinguishing over the prior art, narrowing the claims in view of the prior art, or for statutory requirements directed to patentability.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Finally, it is noted that Applicant's representative traverses the Examiner's

characterization in Paragraph 3 on page 10 of the Office Action: "*Furthermore, Applicant's arguments in response to the restriction requirement (Paper No. 20031121 and 20040105) are considered an acknowledgement that the present method claims are not patentably distinct from the present device claim.*"

Applicant submits that nowhere in these two responses is there even a suggestion that the method claims are not patentably distinct. The arguments address the correctness of the procedures currently of record, the Examiner's interpretations, and the prerequisite that there be an undue burden on the Examiner. None of these arguments even hint at the suggestion that the claims address inventions that are not patentably distinct, as alleged by the Examiner.

Applicant's representative respectfully requests that the Examiner not make such conclusory legal statement on the record, unless those statements are expressly supported in plain language. The Examiner should be aware that such personal opinions of legal conclusions may become the basis of a legal suit and are not appropriate statements in a discourse being conducted on public record, absent clear and indisputable evidence underlying that conclusory statement.

It is brought to the attention of the Examiner that the evaluation of a restriction requirement involves more than the issue of distinctness, not the least being an undue burden on the Examiner, generic claims, and interpretation of the claim language. An objective reading of the responses of the present restriction requirement clearly show that these were the issues being argued, not the issue of distinctness.

It is also noted that the common attitude among patent law practitioners is that Examiners routinely impose restrictions that do not comply with the constraints described in MPEP 800. Therefore, an objective evaluation of a restriction requirement almost always brings to light one or more arguments against the restriction requirement that do not involve the specific issue of distinctness.

Applicant's representative also submits that a primary reason that practitioners commonly hesitate to properly traverse restriction requirements is clearly demonstrated in the fear-factor created by the Examiner's conclusory statement of the latest Office Action, that an objective evaluation of a restriction requirement is characterized as the practitioner conceding that there is no patentable distinctness. As pointed out, the arguments of the Response to

Restriction Requirement filed on November 21, 2003, were directed to issues of undue burden, generic claims, and claim interpretation. Arguing these issues is not a concession that the method claims are patentably indistinct from the device claims.

Claims 1, 3-6, 11-14, 16-20, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over US Patent 5,994,721 to Zhong et al., further in view of US Patent 6,208,399 to Ohta et al.

This rejection is traversed in view of the discussion below.

I. THE CLAIMED INVENTION

Applicant's invention, as defined for example in independent claim 1 (and substantially similarly in independent claims 2, 6, and 7) is directed to an active matrix liquid crystal display device having a first substrate and a second substrate.

At least one of said first substrate and said second substrate is transparent. A plurality of scanning lines is formed on the first substrate. A plurality of signal lines is formed on the first substrate crossing the scanning lines in a matrix manner.

A plurality of thin film transistors is each respectively formed at an intersection of the scanning lines and the signal lines. Each thin film transistor includes a gate electrode formed on said the substrate, a gate insulation layer formed on the gate electrode, a semiconductor layer formed on the gate insulation layer, a drain electrode formed on a first portion of the semiconductor layer and a first portion of the gate insulation layer, and a source electrode formed on a second portion of the semiconductor layer and a second portion of the gate insulation layer.

A passivation film is formed on the thin film transistors. At least one color filter is formed on the first substrate, wherein a color film forming the at least one color filter additionally covers the passivation film.

A plurality of pixel electrodes is each respectively connected to one of the thin film transistors through a contact hole and each respectively is formed on one of said at least one color filter.

A counter electrode is formed on the second substrate. A liquid crystal layer is formed between the first substrate and the second substrate, the liquid crystal layer being driven by

electric fields between the pixel electrodes and the counter electrode to thereby make a display.

The color filter is formed directly on the first substrate in most of a light transmission region within a pixel area surrounded by the scanning lines and the signal lines, a thickness of the color film forming the color filter being a preselected first thickness that provides a sufficient chromaticity for the color filter.

The passivation film provides an additional layer over the thin film transistors that reduces a thickness of material of the color filter near the contact hole to a second predetermined thickness chosen to permit a photo-crosslinkage to occur in the color filter material during an exposure processing of the contact hole, to thereby allow a fine patterning of the contact hole.

Thus, it is possible to make a color filter on a contact portion and on a pattern outline portion thin, while the color filter on the pixel opening portion is thick. In this manner, a high photosensitive color resist can be used and a fine pattern with small exposure can be formed. Thus, an LCD having good display quality, high precision and a high aperture can be manufactured (e.g. see page 5, lines 13-24; page 11, lines 25-27; page 12, lines 1-2; page 13, lines 9-18; and page 17, lines 1-12).

Essentially, as described beginning at line 13 of page 3 and continuing through line 10 of page 5, the inventor has recognized that the prior art has a number of problems due to the thickness of the color filter material over the TFT and, more specifically, in the drain region having the contact through hole to the pixel electrode. The present invention solves these problems by reducing the thickness of this color filter material in this region by choosing the number and thicknesses of underlying layers to achieve a thickness of overlying color filter material that will cure without causing the prior art problems in the drain region.

An exemplary configuration of the first embodiment is shown in Figure 3 in which passivation layer 11 on top of the TFT has a thickness approximately 0.3 μm and the color material on top the TFT has a thickness no greater than 0.4 μm , thereby allowing the material to be cured without causing the problems noted in the prior art. The difference in thickness of the color filter material is further accentuated in the present invention by etching away the gate insulation layer 10 and passivation layer 11 in the pixel area prior to forming the color filter.

In an exemplary configuration of the second embodiment, as shown in Figure 5, an overcoat layer 19 is added on top of the color filter and provides several benefits, as described on page 16, including that of protecting the color filter and acting as a mask for forming the contact through hole, thereby achieving a higher aperture ratio and better display quality than that of embodiment 1.

The conventional systems, such as those discussed below and in the Related Art section of the present application, do not have such a structure, and fail to provide for such an operation.

Such combination of features is clearly not taught or suggested by the cited references.

II. THE PRIOR ART REJECTION

The Examiner alleges that Zhong teaches the present invention defined by independent claim 1 except the Examiner concedes that Zhong fails to teach or suggest using a passivation film on the thin film transistors so that the thickness of the color filter material is reduced in the region of the source contact hole.

To overcome this deficiency, the Examiner relies on Ohta. The Examiner alleges:

"Ohta teaches the use of a passivation film exclusively over and in direct physical contact with the TFT portions to protect a back channel portion of the TFT and thereby stabilize a threshold voltage, V_{th} (col. 8, lines 34-67) without warping of the substrate caused by the stress of said passivation layer. Please note that modification of the device of Zhong with the passivation film of Ohta would result in said passivation film and said color film form a stack of layers that reduces a thickness of material of said color filter near said contact hole such that a portion of said passivation film remains in place adjacent to said contact hole.

Ohta is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a passivation film exclusively over and in direct physical contact with the TFT portions wherein said passivation film and a color film form a stack of layers that reduces a thickness of material of the color filter near said contact hole such that a portion of said passivation film remains in place adjacent to said contact hole to protect a back channel portion of the TFT and thereby stabilize a threshold voltage, V_{th} ,

without warpage of the substrate caused by the stress of said passivation layer."

In response, Applicant first points out that the Examiner's description "... *without warpage of the substrate caused by the stress of said passivation layer*" is irrelevant, since this statement refers to the final clause in the preceding sentence (e.g., at line 45-46 of column 8 of Ohta) in which description it is clear that the lack of warpage is due to having the passivation layer PSV1 formed "... *like an island only at the thin film transistor TFT portion.*" These words clearly indicate that the lack of warpage is because the passivation layer does not cover the entire substrate. Rather it is applied in isolated patches over the TFT portions.

Therefore, Applicant submits that the only motivation to modify Zhong to add the passivation layer PSV1 of Ohta would be that of providing moisture resistance (e.g., lines 36-38 of column 8).

However, the configuration shown in Figure 6(c) of Zhong clearly shows that the TFT is covered by color filter 101. Applicant submits that one of ordinary skill in the art, absent impermissible hindsight, would not have considered that additional moisture protection is required, since this color filter 101 would serve as a moisture barrier absent clear evidence that it is known in the art as being ineffective in that role.

Thus, Applicant submits that the USPTO's initial burden will not have been met unless and until a reference is brought forth that demonstrates that the color filter 101 of Zhong is known in the art as failing to provide a proper moisture barrier, thereby requiring the addition of a passivation layer such as used in Ohta.

Without such knowledge, Applicant submits that the addition of the passivation layer of Ohta would simply increase manufacturing cost and increase weight, so that, contrary to the Examiner's allegation, one of ordinary skill in the art would not be motivated to add a layer that would merely increase cost and weight without providing a compensatory clear benefit.

As pointed out above, a significant aspect of the present invention is that the inventor has recognized that two different thicknesses of the color film layer are required for two conflicting reasons. The prior art references currently of record fail to teach or suggest that the color film layer has such conflicting requirements for the parameter of thickness.

Hence, turning to the clear language of the claim, in Zhong there is no teaching of: "... a passivation film formed on said thin film transistors; at least one color filter formed on said

first substrate, a color film forming said at least one color filter additionally covering said passivation film; ... and said passivation film and said color film form a stack of layers that reduces a thickness of material of said color filter near said contact hole such that a portion of said passivation film remains in place adjacent to said contact hole", as required by claim 1.

For the reasons stated above, the claimed invention is fully patentable over the cited references.

Further, the other prior art of record has been reviewed, but it too, even in combination with Zhong or Ohta, fails to teach or suggest the claimed invention.

III. FORMAL MATTERS AND CONCLUSION

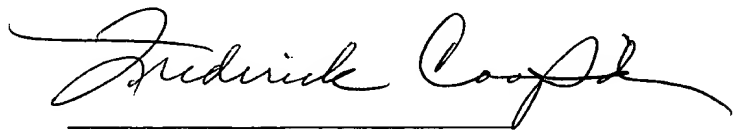
In view of the foregoing, Applicant submits that claims 1-12, 15-18, and 21-23, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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Frederick E. Cooperrider
Reg. No. 36,769

McGinn & Gibb, PLLC
Intellectual Property Law
8321 Old Courthouse Road, Suite 200
Vienna, VA 22182-3817
(703) 761-4100
Customer No. 21254